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Date: April 30, 1973

To: ERTS Contracting Officer
Code 245, GSFC
Greenbelt, Maryland 20771

ERTS Technical Officer
Code 430, GSFC
Greenbelt, Maryland 20771

ERTS Project Scientist
Code 650, GSFC
Greenbelt, Maryland 20771

From: James V. Drew, Principal Investigator (UN-062)
412 Administration Building
University of Nebraska
Lincoln, Nebraska 68508

Re: Progress Report (Type I)

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ERTS Scientific Monitor
Code 650, GSFC
Greenbelt, Maryland 20771

NASA Scientific and Technical
Information Facility
Attn: ERTS Resources
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College Park, Maryland 20740

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E7.3 1062.9

CR-132040

The following progress report summarizes work accomplished from March 1, 1973 to April 30, 1973 according to Article II, Item 3 of the contract schedule included in contract NAS5-21756.

a. Proposal to evaluate the use of ERTS-A imagery in mapping and managing soil and range resources in the Sand Hills Region of Nebraska (MMC #020).

b. GSFC Identification number of principal investigator:
UN-062.

c. Major adjustments in lens mounts and imagery carriage adjustment linkages have been made on the Spectral Data Projector/Viewer. Current evaluation indicates that all problems regarding registration of multiband imagery have not been corrected.

d. Densitometer measurements of images from individual wavelength bands of the multispectral scanner have been made with regard to forage density of selected sites and reflectance differences in lakes for study of water quality. MSS band 5 appears to yield the most information with regard to forage density of the individual wavebands studied. Image 1025-16554, band 5, showed approximately a 0.1 optical density unit difference between subirrigated, sandy and sands range sites, the readings being taken on sites of the same relative forage condition class. However, there does appear to be overlap of density when comparing a low forage condition site of one category with a high forage condition class of another (high condition sands site compared to a low condition sandy site).

E73-10629) PROPOSAL TO EVALUATE THE USE
OF ERTS-A IMAGERY IN MAPPING AND
MANAGING SOIL AND RANGE RESOURCES IN THE
SAND HILLS REGION OF NEBRASKA Progress
(Nebraska Univ.) 6 p HC \$3.00 CSCL 08B

N73-24389

Unclas
G3/13 00629

Optical density measurements of range sites fall in the upper (densest) one-half of the readings for the gray scale of the image studied, indicating the optimum range of density differences for imagery evaluation. Since previous evaluations of high altitude aircraft color infrared photography and color composites of MSS imagery suggest range site delineation into categories based on color recognition, forage density probably can be measured, assuming the site category is determined by other forms of imagery. Densitometer measurements of individual wavelengths of the visible spectrum suggest that forage density can be measured directly on color composites produced from ERTS-1 imagery or from high altitude aircraft color infrared photography.

Densitometer measurements of lakes in Cherry County shown on image 1025-16554, MSS bands 6 and 7, indicate differences in reflectance in both bands. Densitometry values again fall in the range of values of the upper (densest) one-half of the gray scale, indicating the optimum segment of density for determinations. Densitometer values for MSS band 7 segregated the lakes into two categories, with no apparent significance to attach to the two categories, based on available data. MSS band 6 densitometer values segregated the lakes into three categories. Again, available data for water quality did not suggest the cause of this apparent segregation. In both bands the fresh-water reservoirs gave the greatest optical density and the alkaline lakes gave the lowest density readings. However, there did not appear to be a direct linear relationship between alkalinity and densitometry values.

Initial attempts at color composites developed from diazochrome prints of 9 in. x 9 in. MSS waveband images indicate that the technique will be of value in imagery evaluation. A projectable color composite increases the range of image scales at which comparisons can be made between vegetative patterns and soil mapping units.

Color composites produced by the viewer/projector and by the diazochrome technique will be used to evaluate ERTS imagery as a base for individual county, soil association maps. Existing soil association maps and imagery will be adjusted to equal scales and overlaid for comparison.

Field personnel of the Nebraska Game and Parks Commission in cooperation with the Dept. of Interior, Valentine National Wildlife Refuge, have agreed to take water samples and provide observational data with regard to water quality in Cherry County, Nebraska, to provide current data for the lakes observed to have reflectance differences. Samples will be taken periodically during 1973 from thaw to freezeup of the lakes. Routine water quality analyses will be made by the Department of Agronomy water quality lab. Periodic color and color infrared pictures will be taken on the ground to supplement observations.

Data collection to support the Texas A&M Corridor Study was begun. Clipping and capacitance meter measurements were taken of the study sites for further correlation between the two measurement techniques. Seasonal documentation in the form of ground photographs utilizing color and color infrared film were also obtained.

Initial evaluation of winter imagery with snow cover and low sun angle show a marked enhancement of dune patterns. Shadows cast by higher dunes suggest the possibility of differentiation between sands and choppy sands sites, where slope is the major difference between the two sites.

e. There appears to be a direct relationship between densitometry values obtained with MSS band 5 imagery and forage density for those range sites measured on the imagery, provided site category identification is indicated by other forms of imagery or ground truth. Overlap of density values for different site categories with differing forage condition classes does not allow assigning a given forage density value for a given densitometer value.

f. "Application of ERTS-1 imagery in mapping and managing soil and range resources in the Sand Hills region of Nebraska", presented before annual meeting of Nebraska Academy of Sciences, April 13, 1973. Abstract published in abstracts of the meeting.

g. No recommendations are offered at this time.

h. No changes in standing order forms have been requested during the period of this report.

i. Attached are image descriptor forms which list imagery received during the period of this report.

j. A data request form for retrospective data dated April 11, 1973 submitted. As of the writing of this report, the data has not been received.

k. Additional information is not being submitted at this time.

April 30, 1973

Article II, Item 3e; Significant Results:

Discipline 1. Agriculture/Forestry / Range Resources

Subdiscipline C. Range Survey and Classification

e. Significant results:

There appears to be a direct relationship between densitometry values obtained with MSS band 5 imagery and forage density for those range sites measured on the imagery, provided site category identification is indicated by other forms of imagery or ground truth. Overlap of density values for different site categories with differing forage condition classes does not allow assigning a given forage density value for a given densitometer values unless the range site category is known.

EXHIBIT C

ERTS IMAGE DESCRIPTOR FORM

USER NAME James V. Drew
 USER ID UN-062
 AGENCY University of Nebraska

DATE April 30, 1973

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS *				DESCRIPTORS
	Cropland	Dunes	Lakes		
1206-17020-M		X			
1206-17023-M		X			
1206-17025-M	X				
1239-16451-M	X				
1240-16505-M	X				
1240-16511-M	X				
1240-16514-M	X				
1237-16340-M	X				
1237-16342-M	X				
1241-16563-M	X				
1241-16570-M		X			
1241-16572-M	X				
1238-16394-M	X				

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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 Bldg 23 Room E203
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 GREENBELT, Md. 20771

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EXHIBIT C					
ERTS IMAGE DESCRIPTOR FORM					
USER NAME <u>James V. Drew</u>				DATE <u>April 30, 1973</u>	
USER ID <u>UN-062</u>					
AGENCY <u>University of Nebraska</u>					
PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS *				DESCRIPTORS
	Cropland	Dunes	Lakes		
1189-17082-7	X				
1203-16451-M	X				
1203-16453-M	X				
1148-16395-4	X				
1148-16395-5	X				
1026-17015-M	X				
1026-17012-M		X			
1022-16384-M	X				Rangeland
1207-17075-M					
1207-17081-M	X				
1207-17084-M	X				
1219-16342-M					Clouds
1208-17142-M	X				
1208-17140-M	X				
1208-17133-M	X				
1220-16394-M	X				
1220-16340-M	X				
1226-17140-M	X				
1224-17021-M		X			
1224-17024-M		X			
1224-17030-M	X				

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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